

C. APPLICANT'S COMMENTS

Claims 1-8 are pending in this Application, with Claim 1 being amended and Claims 9-12 being added to further clarify the invention. No new matter is added by way of these amendments, and the amendments are supported throughout the Specification and the drawings. Reconsideration of Claims 1-8 and favorable consideration of Claims 9-12 is respectfully requested. The Examiner's rejections will be considered in the order of their occurrence in the Official Action.

Paragraph 1 of the Official Action

The Official Action rejected as-filed Claims 1, 3, 5 and 7 under 35 U.S.C. §102(e) as being anticipated by Patel (U.S. Patent No. 6,484,521). The Applicant respectfully disagrees with this rejection for at least the following reasons.

It is important to first briefly discuss 35 U.S.C. §102 and its application to the present application. Under 35 U.S.C. §102, anticipation requires that the prior art reference both (1) disclose, either expressly or under the principles of inherency, every limitation of the claim, and (2) be enabling thus placing the allegedly disclosed matter in the possession of the public.

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). "The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). Hence, under 35 U.S.C. §102, anticipation requires that each and every element of the claimed invention be disclosed in the prior art. *W.L. Gore & Assocs. v. Garlock, Inc.*, 220 USPQ 303, 313 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984). Anticipation also requires the presence in a single prior art reference disclosure of each and every element of the claimed invention, arranged as in the claim. *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 221 USPQ 481, 485 (Fed. Cir. 1984). In addition, the prior art reference must be enabling, thus placing the

allegedly disclosed matter in the possession of the public. *Akzo N.V. v. United States Int'l Trade Comm'n*, 1 USPQ 2d 1241, 1245 (Fed. Cir. 1986), cert. denied, 482 U.S. 909 (1987) (emphasis added).

Independent Claim 1 has the following features:

1. (Currently Amended) A method of operating a thermal management system for thermally managing at least one electronic device, said method comprising the steps of:

providing at least one spray unit and at least one electronic device in opposition to said at least one spray unit;

spraying a fluid from said at least one spray unit towards said at least one electronic device, **wherein said dispensed fluid has a spray cone angle**; and

adjusting said spray cone angle to control a device temperature of said at least one electronic device.

Independent Claim 5 has the following features:

5. (Currently Amended) A method of operating a thermal management system for thermally managing at least one electronic device, said method comprising the steps of:

spraying a fluid from at least one spray unit towards at least one electronic device, **wherein said dispensed fluid has a spray cone angle**; and

adjusting said spray cone angle to control a device temperature of said at least one electronic device.

Independent Claim 9 has the following features:

9. (New) A method of operating a thermal management system for thermally managing at least one electronic device, said method comprising the steps of:

spraying a continuous and non-incremental spray of liquid coolant from at least one atomizer of a spray unit towards at least one electronic device, wherein said continuous and non-incremental spray of liquid coolant has a spray characteristic; and

adjusting said spray characteristic to control a device temperature of said at least one electronic device.

Figure 18 of the present application illustrates the “spray cone angle” of the dispensed coolant that is adjusted to control the temperature of the electronic device.

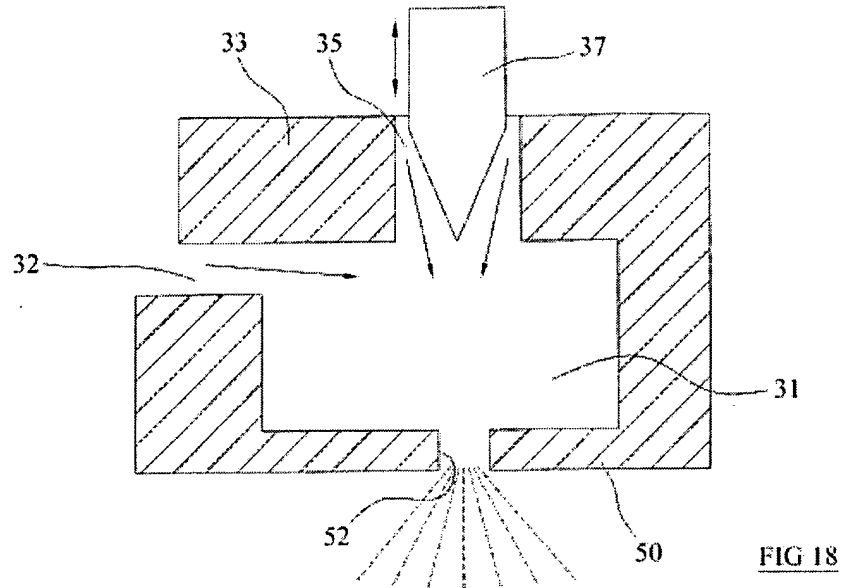
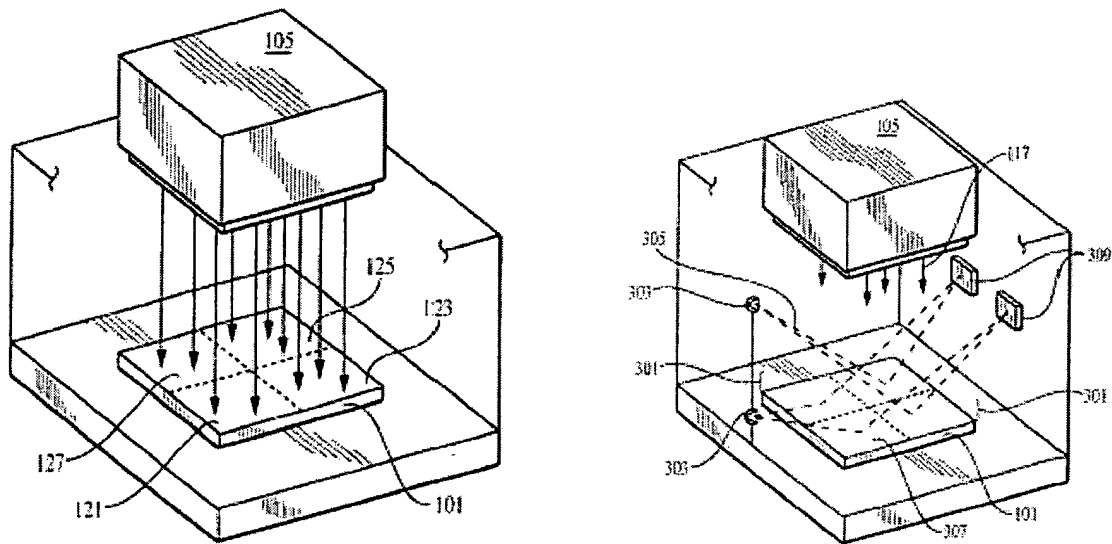


Figure 18 of Present Application

Patel (U.S. Patent No. 6,484,521) merely teaches a “semiconductor chip cooling system configured with thermal inkjet type sprayers controlled by a control system.” (Abstract) More particularly, Patel teaches the usage of “a large number of incremental sprayers, each configured and targeted to eject an incremental amount of the cooling fluid on a particular portion of the chip.” (Column 5, Lines 6-8.) Patel further states that “a preferred type of incremental spray for the spray head 105 is an inkjet-type sprayer.” (Column 5, Lines 55-57.) In Patel, the cooling surface of the chip 101 is divided into “regions” where a specific group of incremental sprayers only targets one region of the chip. (Column 5, Lines 15-25.)



Patel (U.S. Patent No. 6,484,521)

The only means that Patel has to control the temperature of the chip is by adjusting the “flow rate”. Because Patel utilizes incremental sprayers (e.g. inkjet-type), it only teaches the “increasing or decreasing the frequency that a particular group of incremental sprayers is energized.” (Column 5, Lines 15-17.)

With respect to Claims 1 and 5, Patel does not teach the usage of spray nozzles that have an adjustable “spray cone angle” – much less actually adjusting a spray cone angle. The incremental sprayers of Patel are not capable of adjusting a spray cone angle. In fact, Patel teaches away from the present invention since Patel discussed the usage of “pressurized liquid spraying” and that “[t]hese cooling configurations typically spray a uniform or uncontrollably varied distribution of coolant across each chip.” (Column 2, Lines 43-45.)

With respect to added Claim 9, Patel does not teach “**spraying a continuous and non-incremental spray of liquid coolant from at least one atomizer of a spray unit towards at least one electronic device.**” In addition, Patel does not teach “**adjusting said spray characteristic to control a device temperature of said at least one electronic device.**”

The Applicant respectfully submits that Patel does not qualify as appropriate prior art under 35 U.S.C. §102(e) as Patel does not disclose (expressly or inherently) all of the features of independent Claim 1, 5 or 9. Therefore, Applicant respectfully submits that independent Claims 1, 5 and 9 are patentable over the cited reference for at least these reasons. Accordingly, Applicant respectfully requests that the Examiner withdraw the outstanding rejection as applied to independent Claims 1, 3, 5 and 7, since the application is in condition for allowance.

Paragraph 2 of the Official Action

The Official Action rejected Claims 2 and 6 under 35 U.S.C. §103(a) as being unpatentable over Patel (U.S. Patent No. 6,484,521) in view of McDunn (U.S. Patent No. 6,215,166). The Applicant respectfully disagrees with this rejection of these claims.

In proceedings before the United States Patent and Trademark Office, the Examiner bears the burden of establishing a prima facie case of obviousness based upon the prior art. *In re Bell*, 26 USPQ2d 1529, 1530 (Fed. Cir. 1993). *In re Oetiker*, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). When references cited by the Examiner fail to establish a prima facie case of obviousness, the rejection is improper and will be overturned upon appeal. *In re Fine*, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). “To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references.” *Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985).

“To establish a prima facie case of obviousness, three basic criteria must be met.” MPEP §706.02(j). First, there must be some **suggestion or motivation**, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a **reasonable expectation of success**. Finally, the prior art reference (or references when combined) **must teach or suggest all the claim limitations**. The teaching or suggestion to make the claimed combination and the

reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

The law regarding *obviousness* is clear -- any modification of the prior art must be suggested or motivated by the prior art. It is submitted that combining elements from different prior art references (in an attempt to establish obviousness) must be motivated or suggested by the prior art.

'Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. Under section 103, teachings of references can be combined only if there is some suggestion or incentive to do so.' [citation omitted] Although couched in terms of combined teachings found in the prior art, the same inquiry must be carried out in the context of a purported obvious "modification" of the prior art. The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification.

In re Fritch, 972 F.2d 1260; 23 USPQ2d 1780, 1783-84 (Fed. Cir. 1992), (in part quoting from *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1577; 221 USPQ 929, 933 (Fed. Cir. 1984)).

It is also submitted that the mere fact that one may argue that the prior art is capable of being modified to achieve a claimed structure does not by itself make the claimed structure obvious -- there must be a motivation provided by the prior art.

The examiner finds the claimed shape would have been obvious urging that (our emphasis) "it is obvious for one skilled in the art to form each hook base of any desired shape *** since *this is within the capabilities of such a person*." Thus, the examiner equates that which is within the capabilities of one skilled in the art with obviousness. Such is not the law. There is nothing in the statutes or the case law which makes "that which is within the capabilities of one skilled in the art" synonymous with obviousness.

The examiner provides no reason why, absent the instant disclosure, one of ordinary skill in the art would be motivated to change the shape of the coil hooks of Hancock or the German patent and we can conceive of no reason.

Ex parte Gerlach and Woerner, 212 USPQ 471 (PTO Bd. App. 1980) (emphasis in original).

Claims 2 and 6 have the following features:

increasing electrical power to said at least one electronic device if a device temperature of said at least one electronic device is below a desired temperature and decreasing electrical power to said at least one electronic device if a device temperature of said at least one electronic device is above a desired temperature.

The Office Action stated that McDunn illustrates that “controlling the power to the device in accordance with the sensed temperature” is well known. McDunn merely teaches the usage of “power input leads 25 made in whole or in part of a fusible material.” (Column 4, Lines 41-42.) This fusible material has “predetermined temperature thresholds” such that the power input leads “melt” creating “an open circuit” effectively removing electrical power from the transistor when an excessive temperature occurs. (Column 4, Lines 47-54.)

McDunn does not teach “increasing electrical power to said at least one electronic device if a device temperature of said at least one electronic device is below a desired temperature.” At best, McDunn merely maintains a “closed circuit” with no change in the electrical power.

In addition, McDunn does not teach “decreasing electrical power to said at least one electronic device if a device temperature of said at least one electronic device is above a desired temperature.” McDunn teaches melting of electrical leads to open the circuit thereby terminating all power flow if the temperature of the power input lead itself rises above its melting temperature. In other words, the temperature of the semiconductor itself could be greater or lower than the melting point of the power input lead based upon the spray cooling.

Hence, McDunn merely teaches permanently terminating electrical power if the power input lead exceeds its melting temperature. It should also be noted that McDunn’s termination of electrical power is irreversible unlike the present invention which is able to increase/decrease electrical power as required without disruption of the operation of the electronic device being thermally managed. However, McDunn is not capable of decreasing electrical power to the


electronic device, particularly decreasing electrical power based upon the temperature of the electronic device.

For these reasons, among others, the combination of Patel with McDunn cannot suggest the combination of features in applicant's Claims 2 and 6, and it is therefore submitted that the rejection against these claims should be withdrawn and Claims 2 and 6 allowed.

D. CONCLUSION

In light of the foregoing amendments and remarks, early reconsideration and allowance of this application are most courteously solicited. Should the Examiner consider necessary or desirable any formal changes anywhere in the specification, claims and/or drawing, then it is respectfully asked that such changes be made by Examiner's Amendment, if the Examiner feels this would facilitate passage of the case to issuance. Alternatively should the Examiner feel that a personal discussion might be helpful in advancing this case to allowance, they are invited to telephone the undersigned.

Respectfully submitted,



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